

RESEARCH PROJECT SEGMENT

State: Alaska Name: Sport Fish Investigations
of Alaska

Project No.: F-9-7

Study No.: G-III Study Title: LAKE AND STREAM INVESTIGATIONS

Job No.: G-III-E Job Title: Evaluation of Interior
Alaska Waters and Sport
Fish with Emphasis on
Stocked Lakes.

Period Covered: July 1, 1975 to June 30, 1975.

ABSTRACT

Eight lakes stocked with rainbow trout, Salmo gairdneri, or silver salmon, Oncorhynchus kisutch, were sampled with gill nets, fyke nets, bag seine, or a boat shocker to evaluate survival and growth. A comparison of the efficiency of the various types of gear is discussed. Population estimates of age I silver salmon in Bolio Lake indicated high survival from fingerling stocked in 1973. Shoreline seining was effective in sampling age 0 rainbow trout in Little Donna Lake. A survival estimate of 18% made only two months following stocking indicated high initial mortality following stocking.

Nine Interior Alaska lakes were surveyed and fish species composition, physical and chemical characteristics are presented.

Creel census was conducted on three popular sport fisheries in the Delta area. Use estimates, size of fish caught and catch rates are presented for George and Quartz lakes and Shaw Creek.

Follow-up sampling was conducted on the Delta River to determine movement and age and length distribution of Arctic grayling, Thymallus arcticus. No upstream movement of grayling from below the falls was observed, although downstream movement of tagged grayling from above the falls to the middle falls section was noted.

Grayling enhancement efforts through experimental stocking were conducted on Clearwater River and Clearwater Lake. Preliminary findings are reported. Pre-rehabilitation surveys were completed on Chet, "J", and Nickel lakes located on Ft. Greely.

A silver salmon egg take on the Delta Clearwater River provided a total of 169,800 eggs. Mortality during the first five months was 12.5%.

A round whitefish, Prosopium cylindraceum, utilization study on the Delta Clearwater River was conducted. Angling methods and seasonal availability are evaluated.

Access evaluation and effects of pipeline construction activity in the Delta area are reported.

RECOMMENDATIONS

1. Continue a study of George Lake to determine relative abundance, age and growth, spawning areas and harvest of northern pike.
2. Conduct cataloging and inventory of lakes and streams located in the Delta River drainage from the Alaska Range to Big Delta.
3. Initiate a study of the fall distribution of whitefish in the Tanana Drainage (Delta area).
4. Rehabilitate Chet, "J", and Nickel lakes located on Ft. Greely Military Reservation and conduct a pre-rehabilitation survey on Island Lake southeast of Tok.
5. Continue the evaluation of stocking policies in Interior Alaska lakes stocked with rainbow trout and silver salmon with emphasis on determining survival and growth during the first year following stocking.
6. Continue to monitor the sport fish waters of the area with increased utilization of combined aerial counts and angler interviews.
7. Obtain fish samples in established study sections on the Goodpaster River using electrofishing gear to determine population levels, age, length and species composition.

OBJECTIVES

1. To evaluate stocking policies for rainbow trout and silver salmon and continue studies of stocking rates, timing, and size of introduced fish, strains, and interspecies and intraspecies relationships to formulate stocking recommendations for optimum survival and growth.
2. To determine the environmental characteristics and fish species composition of the waters of the job area, and where practical, obtain estimates of existing or potential angler use and sport fish harvest.
3. To evaluate application of fishery restoration and enhancement measures and determine availability of sport fish egg sources.
4. To develop methods of increasing angler utilization of whitefish in the Tanana and Delta Clearwater rivers.
5. To assist as required in the investigation of public access status to the area's recreational fishery waters.

6. To evaluate and monitor oil and pipeline construction and its effects on the area's streams and lakes including effects of increased angler utilization for the protection of the sport fish resources.

TECHNIQUES USED

Stocked lakes were sampled under the ice (other lakes were netted during the summer) using graduated mesh monofilament gill nets, 125' x 6', with five mesh sizes ranging from 1/2" to 2 1/2" square measure. Additional sampling was done in selected stocked lakes with an alternating current boat shocker as described by Van Hulle (1968), New Hampshire style fyke nets with 5/8" mesh, 50' center leads and 25' wings, a 50' x 6' nylon bag seine with 1/4" mesh, and a 50' x 10' nylon bag seine with 1/2" mesh.

Chemical analysis of water samples was done with a Hach (Model AL-36-WR) kit and lake depths were determined with a Lowrance echo sounder.

Creel census was conducted during anticipated high use periods on selected waters. Data were collected during angler interviews.

Fish populations in streams were sampled with the boat shocker, sport fishing gear, and a Coffelt back-pack electroshocker (Model BP-2). Fish were measured to fork length in millimeters. Population estimates were based on a ratio of marked to unmarked fish in the sample using the standard Petersen equation.

Scales from captured fish were taken for age determination. The scales were cleaned, mounted on gummed cards, and heat pressed onto acetate sheets. A Bruning 200 microprojector was used to read the scales.

FINDINGS

Fish Stocking Evaluation

Sampling Results and Gear Comparisons:

Eight lakes stocked with rainbow trout, Salmo gairdneri, or silver salmon, Oncorhynchus kisutch, or both were sampled by under-ice gill netting for evaluation of growth and survival of stocked fish. The primary purpose of under-ice netting is that sampling at the end of the growing season allows better growth comparisons. Samples on five of the lakes were considered adequate; however, net catches on the other three lakes, Donna, Little Donna, and Mark, were not thought to be representative of the actual population, based on creel census observations. Netting results are presented in Table 1. In addition to gill netting, three lakes - Bolio, Little Donna, and Lisa - were sampled by other means for comparison of sampling efficiency.

Table 1. Population Characteristics of Stocked Lakes Determined by Graduated Mesh Gill Nets, Interior Alaska, 1974.

Lake	Date Sampled	Species*	Number	Age Class	Length (mm)		Frequency **
					Range	Mean	
Bolio	Nov. 11	SS	30	I	156-268	184	0.58
		SS	16	III	345-469	362	0.31
Craig	Dec. 12	RT	20	0	95-115	104	0.40
		SS	18	I	115-230	132	0.36
Donna	Dec. 5	RT	1	III	366		0.02
Little Donna	Jan. 21	RT	1	0	100		0.05
		RT	1	I	329		0.05
		RT	2	IV	385-389	387	0.10
Lisa	Dec. 11	SS	5	0	103-113	107	0.10
		SS	17	II	225-272	245	0.34
		RT	6	III	297-402	344	0.12
Mark	Nov. 11	RT	1	II	280		0.02
Quartz	Nov. 14	RT	22	I	275-352	323	0.52
		RT	10	II	409-470	445	0.24
		SS	1	II	451		0.02
South Twin	Nov. 12	SS	18	0	120-202	143	0.36

*RT - Rainbow trout

SS - Silver salmon

**Fish per hour - 125' graduated mesh gill net.

Bolio Lake was also sampled by seining, boat shocking, and fyke netting. These samples were conducted for the purpose of estimating the population level of age I silver salmon (discussed later). Each of these methods provided excellent samples of age I silver salmon; however, age III silver salmon were not captured.

In 24 seine hauls during June, 1,266 age I silver salmon were captured for a mean catch per haul of 53. As many as 571 were captured in a single haul. A sample of 29 on June 28 had a length range of 135-158 mm with a mean of 141 mm.

An excellent catch was made with fyke nets also on June 28. A total of 2,210 age I silver salmon (25% of the estimated population) was caught in a single overnight set in this 52 hectare (128 acre) lake. This set was made over a hard sand and gravel bottom in a depth of 1.0 m. A similar set at the opposite end of the lake over soft bottom captured only nine silver salmon.

Boat shocking on Bolio Lake during darkness on September 4 resulted in the capture of 308 age I silver salmon in 2.5 hours of shocking. Although boat shocking is normally effective in capturing all age classes, no age III silver salmon were taken. During gill netting in November, 16 age III and 30 age I silver salmon were captured.

In addition to gill netting, Little Donna Lake (19 hectares or 47 acres) was sampled by seining to assess survival of age 0 rainbow trout. During three days of seining a total of 2,053 rainbow trout was captured. Mean catch per haul was 205. This sampling is discussed further in the following section on population estimates. Sampling on Lisa Lake was conducted in mid-June using a fyke net and beach seine. The purpose was primarily to determine the effectiveness of these tools for assessing age I rainbow trout stocked in July, 1973. An overnight fyke net set captured only one rainbow trout (158 mm), but 178 age II silver salmon were also netted. The silver salmon had a length range of 185-219 mm and a mean of 208 mm.

Shoreline seining also failed to sample age I rainbow trout, although 23 age II silver salmon were captured in three hauls. These samples as well as the December gill netting which failed to capture any age I rainbow trout indicate poor survival of the 9,500 rainbow trout stocked at a size of 54/1b. on July 18, 1973.

Night boat shocking was attempted on Lisa Lake on September 26, however equipment failures forced curtailment of shocking before adequate fish collections could be made. Further shocking effort was not attempted due to the lateness of the season and the fact that seining and fyke netting had been conducted and winter gill netting was planned.

Table 2. Estimated Population of Stocked Fish in Two Interior Alaska Lakes, 1974.

Date	No. Marked Prior to Estimate	Sample Method	Total Examined	Recaptures	Population Estimate	Percent Survival
<u>Bolio Lake - Age I Silver Salmon</u>						
Sept. 4	3,571	Boat shocker*	308	112	9,820	97
Nov. 11	3,571	Under Ice Gill Net	30	12	8,928	88
<u>Little Donna Lake - Age 0 Rainbow Trout</u>						
Sept. 25	1,346	Seine	707	331	2,875	18

*Approximately 2.5 hours of shocking during darkness with one person dipping fish.

Stocking Survival and Age and Growth:

Fish population estimates were conducted on Bolio and Little Donna lakes using the mark and recapture method. The purpose of the estimates was to determine stocking survival of age I silver salmon in Bolio Lake and age 0 rainbow trout in Little Donna Lake.

Fish were captured for marking from July 5 to July 31 on Bolio Lake, utilizing a bag seine and two fyke nets. All unmarked fish captured were given an adipose fin clip. Fish captured during subsequent samplings in September and November by boat-mounted shocker and under-ice gill netting were examined for marks. Estimates made using the standard Petersen equation are summarized in Table 2.

Both estimates of survival are higher than two estimates of similar sized silver salmon in Lisa Lake in June and July, 1973, (Peckham, 1974). Those estimates ranged from 50 to 55% survival. Fish from previous year classes that could prey on newly stocked fish were present in both lakes. However, fish stocked in Lisa Lake were subjected to greater handling and crowding since they had to be transferred to carriers and hauled via all-terrain vehicle to the lake. Fish planted in Bolio Lake were stocked directly from the hatchery truck.

Twenty-nine silver salmon sampled in Bolio Lake on June 28, 1974, had a length range of 135-158 mm with a mean of 141 mm. These fish were stocked at a size of 440/lb. and a rate of 79/acre on July 13, 1973. Similar growth of silver salmon was recorded in Lisa Lake on June 28, 1973 (Peckham, 1974).

A sample of 20 fish had a length range of 125-146 mm and a mean of 135 mm. These fish had been planted more than a month later, on August 29, 1972, and at a higher density of 180/acre although they were larger in size (243/lb.). The silver salmon stocked in Bolio were of Green River Federal Hatchery origin while those stocked in Lisa Lake were from the Delta Clearwater source.

Little Donna Lake was stocked with 16,300 rainbow trout at a size of 279/lb. on July 23, 1974. The fish were in transit approximately nine hours from the Fire Lake Hatchery at Eagle River to Ft. Greeley where they were loaded in carriers on board a military helicopter. Flight time to Little Donna Lake was approximately 20 minutes. The helicopter landed near the lake and the fish were released directly into the water from plastic bags. An overall mortality at stocking of 13.3% was due to oxygen depletion in one of the eight plastic bags. Condition of fish in the other seven bags was recorded as fair.

During shoreline seining on September 12 and 13, 1,346 rainbow trout were captured. All trout captured were marked with an adipose fin clip and returned to the lake.

On September 25, three seine hauls captured 707 rainbow trout, of which 331 were marked. This provides a point estimate of 2,875 (Table 2), or a survival of only 18% for fingerling rainbow trout stocked in July. An estimate on Jan Lake on September 25, 1973, indicated a survival of 26% for age 0 rainbow trout stocked in July (Peckham, 1974). Each of these estimates indicate that rainbow trout suffer a high initial mortality in the first two or three months following stocking.

Redick (1971) reported a survival of 24.3% for rainbow trout surviving to age I in Johnson Lake in competition with indigenous threespine sticklebacks, Gasterosteus aculeatus. However, Redick noted a sampling bias which could have resulted in an overestimate of the true survival rate. Watsjold (1973) reported rainbow trout survival rates (to age I) from 2.9 to 4.1% for fish stocked in June at sizes of 88-333/lb., respectively. This study was also in Johnson Lake where threespine sticklebacks were present.

Interior Alaska Lake Surveys

Nine Interior Alaska lakes were surveyed during 1974 to provide additional physical, chemical, and biological information for management purposes. Netting results are summarized in Table 3 while physical and chemical data are presented in Table 4. Bottom contour maps are on file in the Fish and Game office in Delta Junction.

A brief summary of findings follows.

Chet, "J", and Nickel Lakes:

These three small lakes located on Ft. Greely, approximately 18 miles south of Delta Junction, were surveyed to provide pre-rehabilitation information. Although grayling, Thymallus arcticus, are present the fish population is predominately longnose suckers, Catostomus catostomus. Slimy sculpin, Cottus cognatus, were also captured. These lakes are interconnected during spring runoff.

Crystal Lakes #1 and 2:

These lakes, located south of Fielding Lake near Isabel Pass, were surveyed in July. Grayling were the only fish captured in both lakes. Mean lengths of the grayling were 258 mm and 310 mm in Crystal #1 and Crystal #2, respectively. Grayling fry were observed in the shallows in both lakes. Crystal Lake #1 was stocked with a total of 21,000 rainbow trout in 1960, 1962, and 1963. A total of 50,000 rainbow trout was again stocked in Crystal #1 in July, 1974.

Glacier Lake:

This 172 hectare (426 acre) lake, located near mile 31 on the Denali Highway, was surveyed in late August. A 3.3 km (2 mi.) trail leads to the lake. As shown in Table 3, lake trout, Salvelinus namaycush, round whitefish, Prosopium cylindraceum, and burbot, Lota lota, were captured in gill nets.

Although grayling were not netted, anglers contacted on the connecting stream-lake system 1.0 km below Glacier Lake had caught 16 grayling ranging from 236-350 mm.

Table 3. Test Netting Summary of Interior Alaska Lakes, 1974.

Lake	Date	Species*	Number	Length (mm)		Freq.**	% Comp.
				Range	Mean		
Chet	June 26	GR	21	162-314	227	0.53	16.4
		S	97	103-284		2.43	75.8
		SSC	10	76-95		0.25	7.8
"J"	June 26	GR	47	201-346	244	1.18	31.5
		S	101	87-314		2.53	67.8
		SSC	1	95		0.02	0.7
Nickel	June 26	GR	3	307-315	312	0.08	4.6
		S	62	195-248		1.55	95.4
Crystal #1	July 16	GR	53	125-359	258	1.33	100.0
Crystal #2	July 16	GR	31	161-365	310	2.58	100.0
George	Aug. 23&24	NP	20	288-812	573	0.27	30.3
		HWF	30	278-408	339	0.40	45.4
		LCI	4	187-216	205	0.05	6.1
		S	11	403-502	447	0.15	16.7
		BB	1	650		0.01	1.5
Glacier	Aug. 30	LT	21	274-647	433	0.55	58.3
		RWF	14	228-392	312	0.37	38.9
		BB	1	490		0.03	2.8
Two-Bit	July 17	LT	59	120-420	341	2.68	100.0
81 Mile	Aug. 28	GR	13	185-212	201	0.68	100.0

*BB - Burbot

GR - Grayling

HWF - humpback whitefish

LCI - Least cisco

S - sucker

LT - Lake trout

NP - Northern pike

RWF - Round whitefish

SSC - Slimy Sculpin

**Fish per hour - 125' graduated mesh gill net.

Table 4. Morphometric and Chemical Characteristics of Nine Interior Alaska Lakes, 1974.

Location	Surface Area		Max. Depth (meters)	Elevation (feet)	Total Alk. (ppm)	Total Hardness (ppm)
	Hectares	Acres				
Chet T12S, R10E, Sec. 32	2.0	5	11.6	1,925	17	51
"J" T12S, R10E, Sec. 32	3.2	8	16.5	1,925	51	68
Nickel T12S, R10E, Sec. 32	1.2	3	11.3	1,925	34	34
Crystal #1 T20S, R11E Sec. 28	31	77	13.7	3,490	17	17
Crystal #2 T20S, R11E, Sec. 27	28	70	9.1	3,505	17	17
George 63°47' N 144°30' W	1,844	4,557	11.0	1,276	68	103
Glacier T21S, R8E, Sec. 5,7 & 8	172	426	25.6	3,687	34	17
Two Bit T20S, R11E, Sec. 33 T21S, R11E, Sec. 4	109	269	19.8	3,298	17	51
81 Mile Pit T8S, R9E Sec. 8	0.4	1	5.5	950	170	170

Two Bit Lake:

Located approximately 3.0 km north of mile 7 on the Denali Highway, this 109 hectare (269 acre) lake provides good fishing for lake trout in the 330-420 mm size range. Gill netting in mid-July captured 59 lake trout ranging from 120 to 420 mm. Catch per net hour was 2.68. No other fish were captured, however during spring runoff the outlet stream connects to Fielding lake which contains grayling, whitefish, and burbot as well as lake trout.

81 Mile Pit:

This 0.4 hectare (1 acre) gravel pit is located at mile 283.5 on the Richardson Highway. The lake was stocked almost annually from 1953-1971 with rainbow trout. However, low dissolved oxygen levels recorded in recent years resulted in total winterkill. Dissolved oxygen on March 30, 1972, was 0.6 ppm. Since grayling have demonstrated an ability to tolerate low dissolved oxygen levels (Roguski, 1969), 3,000 fry were stocked in 81 Mile Pit on June 15, 1973. Sampling with one gill net on August 28, 1974 captured 13 grayling ranging from 185 to 212 mm with a mean length of 201 mm.

George Lake:

George Lake is a 1,844 hectare (4,557 acre) lake located about 62 km (38 mi.) southeast of Delta Junction. A three year lake survey was initiated on George Lake in 1974. Much of the effort in 1974 was directed toward monitoring of the sport fish harvest, presented later under creel census.

Other survey information collected included location of northern pike, Esox lucius, spawning areas, seasonal abundance and species composition of fish in the inlet and outlet streams, and food preferences of northern pike. These items and others will be reported on during the next two years as additional data are collected.

Although grayling and round whitefish were not captured in the lake by gill nets or shoreline seining, they were collected in George Creek approximately 100 m below the lake outlet on August 25, 1974. Seining with a 50' bag seine captured 66 grayling (93-108 mm) and 7 round whitefish (99-158 mm).

Adult grayling and round whitefish were observed in the creek during the summer. A 305 mm grayling tagged in the Goodpaster River on July 19, 1973, was caught by an angler in George Creek on June 2, 1974.

Creel Census

George Lake:

George Lake is the most popular northern pike lake in the area, providing recreational fishing not only to Delta and Ft. Greely anglers, but also to visiting resident and nonresident fishermen. Access during the summer is limited to riverboat or float plane. A commercial transporter operating from George Lake Lodge (Mile 1385 Alaska Highway) provides riverboat transportation and boat and cabin rental at the lake.

Fishing pressure in past years has been heaviest from ice-out, in late May or early June, through mid-July. In 1974, creel census was conducted during two weekends in June and one weekend in July. An estimated 3,000-4,000 man hours of angler effort were expended from June to mid-September, based on use figures provided by the transporter at George Lake Lodge. Results are summarized in Table 5. Anglers interviewed released approximately 75% of the northern pike caught. A sample of 59 northern pike retained by anglers had a length range of 300-803 mm with a mean of 518 mm.

Table 5. George Lake Creel Census Summary, June 7 to July 22, 1974*

Number Anglers Contacted	65
Civilian	37 (57%)
Military	28 (43%)
Total Hours Fished	423
Man Hours/Angler Trip	6.5
Total Fish (NP)** Caught	428
Fish Retained	109
Fish Released	319
Catch/Hour (total catch)	1.01
Catch/Hour (fish retained)	0.26
Length Range of NP Retained (N=59)	300-803 mm
Mean Length of NP Retained (N=59)	518 mm
Total Estimated Man Hours	3,000-4,000

*Creel census taken during three weekend periods.
 **Anglers interviewed did not report capturing any species from the lake other than northern pike.

Quartz Lake:

Rehabilitated in 1970, Quartz Lake has become the most popular stocked lake in Interior Alaska. The single access and parking area on this 1,500 acre lake was filled beyond its capacity on most weekends during the summer season. Although the creel census study was not designed to provide total use, an expansion of the data based on observed pressure provides an estimate of approximately 30,000 man hours during the summer season. Creel census was conducted on each of the three major summer holiday weekends

(Memorial Day, Independence Day, and Labor Day). Results are summarized in Table 6. The catch success of 0.43 fish/hr. was slightly higher than the 0.35 fish/hr. recorded in 1973 (Peckham, 1974).

Length frequency of 433 sport harvested rainbow trout is shown in Figure 1. In May the sport catch was predominantly larger trout with a mean length of 407 mm. Ninety-one percent were 350-470 mm in length. In July, 63% of the catch were less than 350 mm in length, as an increasing number of trout stocked the previous summer began entering the creel. In September, 59% of the catch was less than 350 mm in length and the mean length was 347 mm.

Shaw Creek:

An early grayling fishery occurs at the mouth of Shaw Creek each spring, usually beginning in the second or third week of April. The fish congregate in the Tanana River at its confluence with Shaw Creek as ice break-up occurs. Break-up on the Tanana River usually precedes break-up on Shaw Creek by a week or more. During this time the grayling are very vulnerable to sport harvest.

Angler interviews were conducted from April 17 through April 20, 1974. Close monitoring of the fishery indicated that no harvest occurred prior to the 17th and although fishing after the 20th was noted, success after that date dropped sharply. The creel census data collected are summarized in Table 7. Length frequency of 187 grayling entering the sport harvest is presented in Figure 2.

It is estimated that the 35 anglers contacted represents approximately half of the total use during the four day period.

Table 7. Shaw Creek Creel Census Summary, April 17-20, 1974.

Anglers Contacted	35
Hours Fished	80.5
Grayling Caught	195
Length Range (mm)	180-411
Mean Length (mm)	294
Grayling/hour	2.4

Upper Delta River Studies

In 1973, 666 grayling were tagged in the upper Delta River flowing from Tangle Lakes. Of this total, 330 were tagged from the outlet of Tangle Lakes to the falls located approximately 2.6 km (1.6 mi.) downstream and 336 were tagged from below the falls to Eureka Creek (Peckham, 1974).

Table 6. Quartz Lake Creel Census Summary, 1974.

	Anglers Contacted	Fish Caught*			Angler Hours	Fish/ Hour	Resident	Non- Resident	Civilian	Military
		RT	SS	Total						
Memorial Day Weekend	225	209	13	222	881	0.25	129	77	62	144
Independence Day Weekend	158	267	...	267	462	0.58	112	28	69	71
Labor Day	<u>135</u>	<u>277</u>	<u>...</u>	<u>277</u>	<u>440</u>	<u>0.63</u>	<u>22</u>	<u>17</u>	<u>18</u>	<u>21</u>
Total	518	753	13	766	1,783	0.43	263(68%)	122(32%)	149(39%)	236(61%)

*RT - Rainbow trout
 SS - Silver salmon

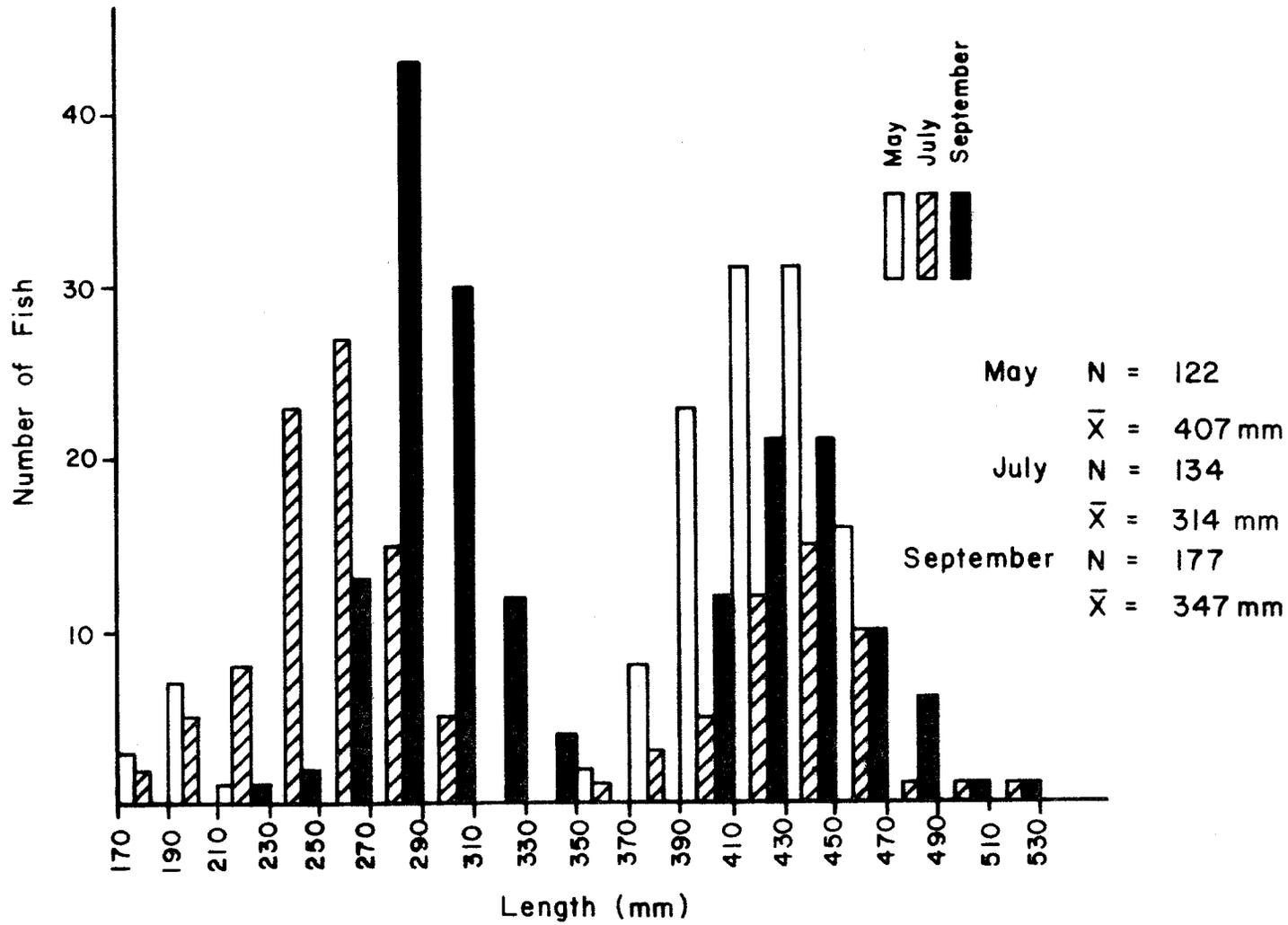


Figure 1. Length Frequency of Rainbow Trout Sport Harvest From Quartz Lake on Memorial Day, Independence Day, and Labor Day Weekends, 1974.

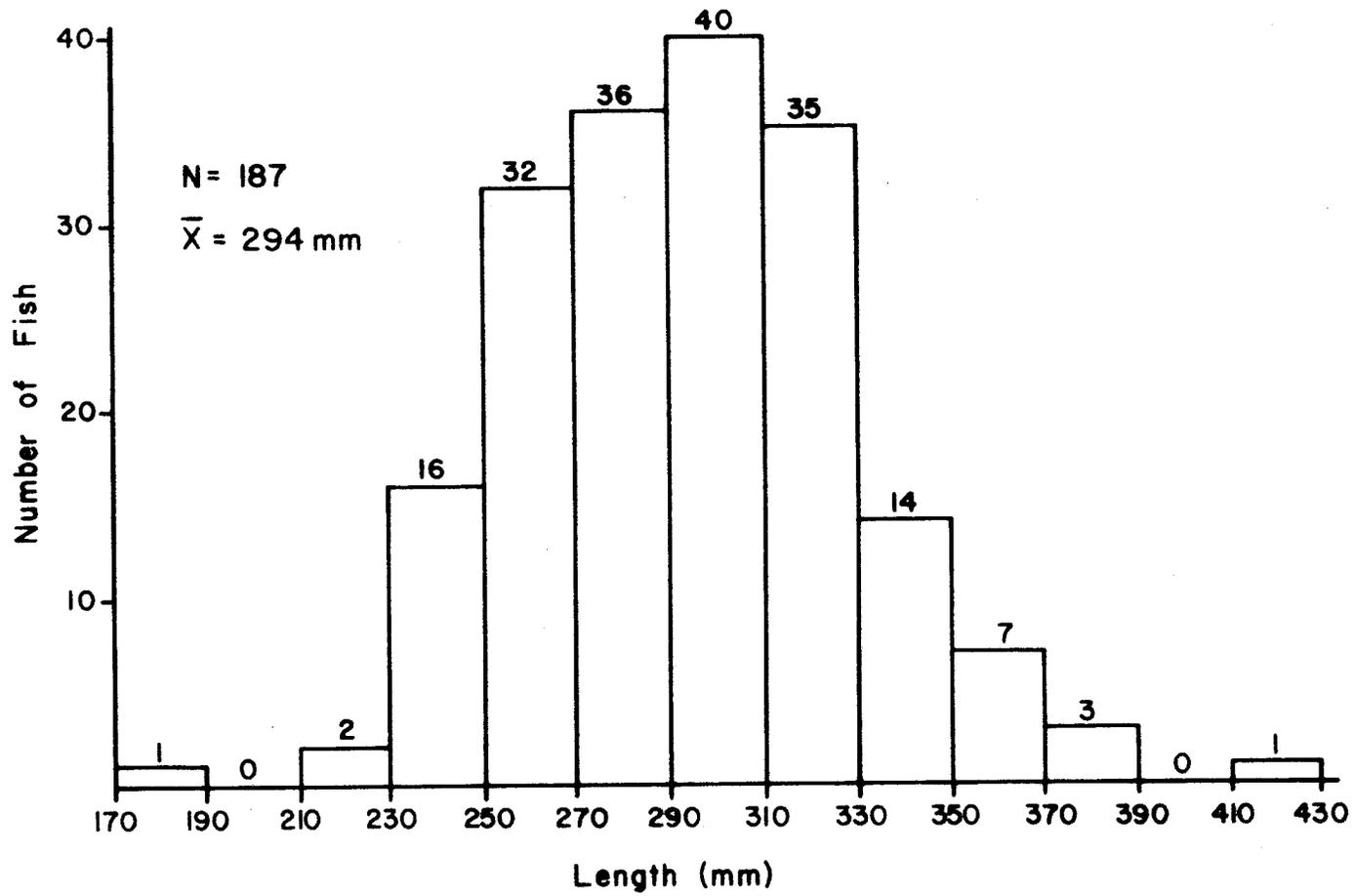


Figure 2. Length Frequency of Angler-Caught Grayling at Mouth of Shaw Creek, April 17-20, 1974.

The purpose of the tagging was primarily to determine if movement of grayling occurs in the area of the falls. The falls are believed to be impassable to upstream migrating grayling.

Tag recovery has occurred from angler returns and sampling efforts by sport fish personnel. Twenty-two tag returns have been received from anglers through the 1974 field season. Twelve of these were from grayling tagged above the falls and 10 from below the falls. All of the fish were reported caught in the same area as tagged relative to the falls. Three tags were returned within one month, while the other 19 tagged fish were in the stream 11 to 13 months before being caught by anglers.

A boat-mounted shocker and hook and line were utilized by sport fish personnel to sample the fish population and recover tags in 1974. Shocking was limited to the section of river downstream from the falls, while hook and line sampling was possible in both sections.

A total of 11 tag recoveries was obtained by hook and line while only one was taken with the shocker. Of the 11 taken by hook and line, five were recovered above the falls, five were captured in the section called the middle falls (between the first and second falls) and one was taken below the falls. The 10 grayling recovered above the falls and in the middle falls section were all tagged above the falls. The one caught below the falls had been tagged in that section.

It is possible that the five grayling tagged above the falls and recovered in the middle falls section may have drifted downstream as a result of being in a weakened condition from tagging and handling.

These fish had a mean increase in length of 21 mm in approximately 12 months from time of tagging.

Sampling with the boat shocker downstream from the falls, from below Wildhorse Creek to Eureka Creek, was conducted on July 25 and 26. Fish captured included 355 grayling and 144 round whitefish. Length range for the grayling was 110-401 mm with a mean of 287 mm. The round whitefish had a length range of 180-406 mm with a mean of 303 mm. Length frequency distribution of the grayling and round whitefish are presented in Figures 3 and 4, respectively. Fish sampled by hook and line numbered 333 above the falls. These fish had a length range of 180-375 mm with a mean of 298 mm. Length range for 327 grayling caught by hook and line below the falls was 160-386 mm. Mean length was 270 mm.

Length frequency distribution for the grayling captured by hook and line above and below the falls is shown in Figures 5 and 6, respectively. As in 1973, grayling captured above the falls had a greater mean length than those below the falls. In 1973, grayling (n=279) captured above the falls had a mean length 28 mm greater than the 327 grayling sampled below the falls (Peckham, 1974). This may indicate better growth of grayling having access to the lake system. The age composition of 209 grayling sampled in the Tangle Lakes and Delta River in 1973 is shown in Table 8.

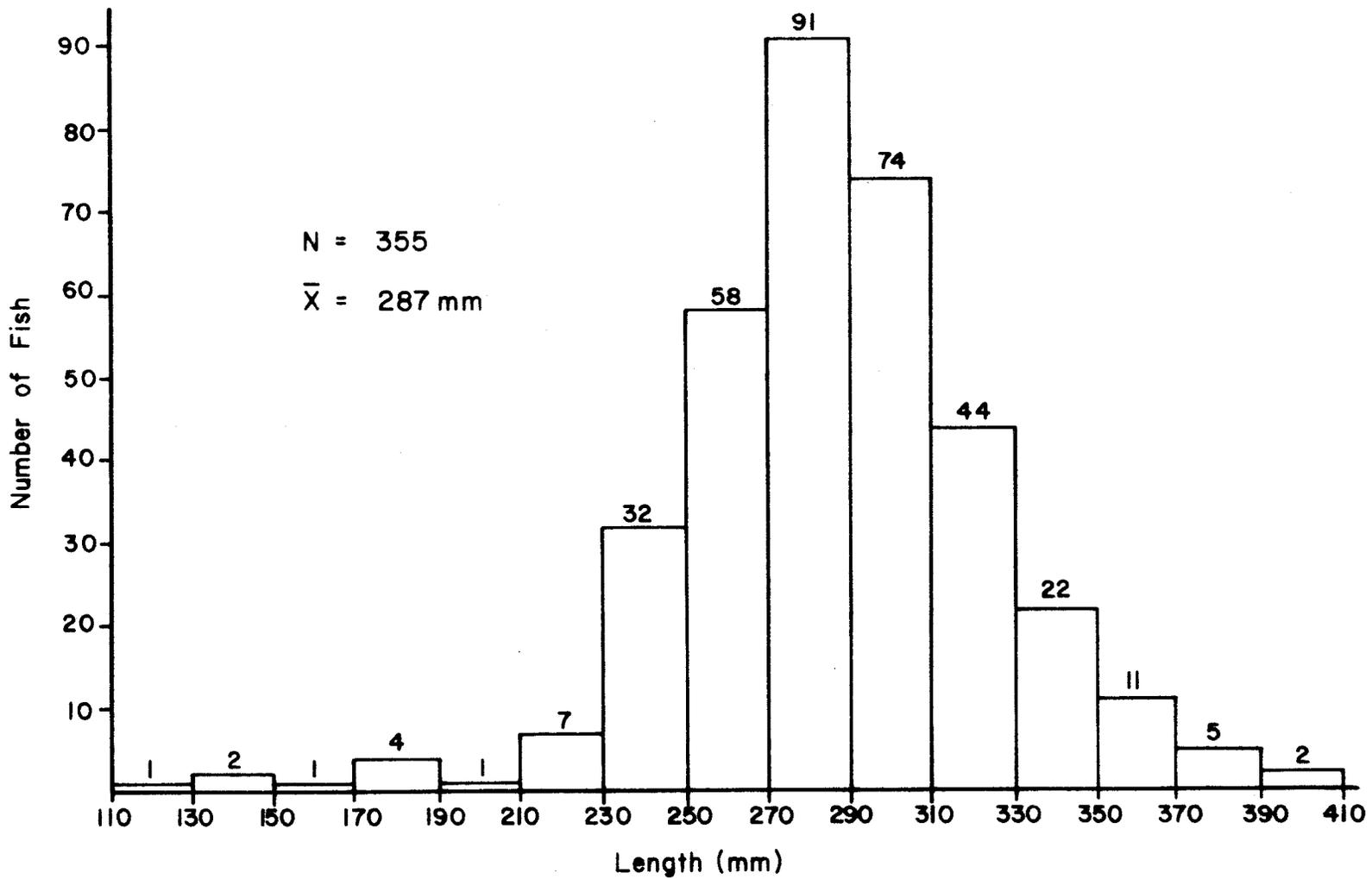


Figure 3. Length Frequency of Grayling Captured by Shocker Boat Below Falls in Delta River, 1974.

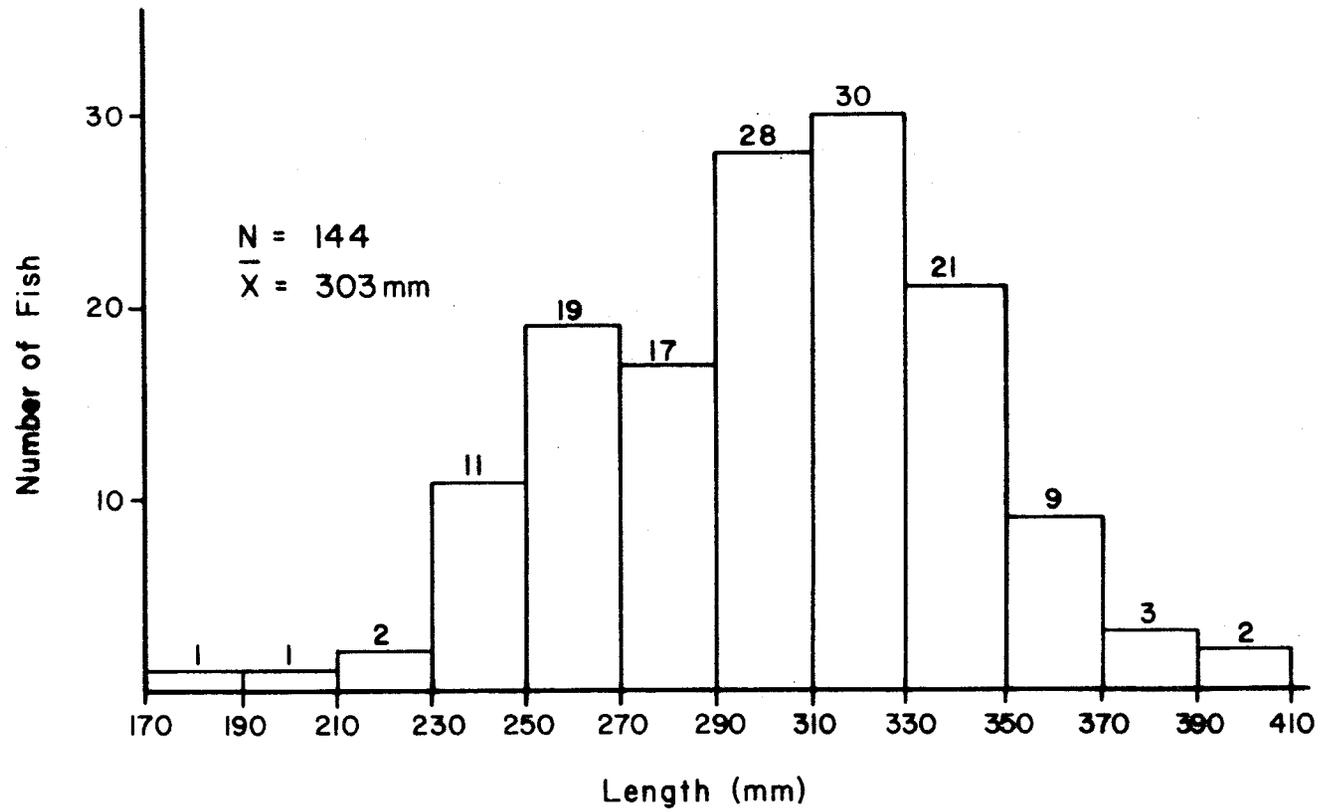


Figure 4. Length Frequency of Round Whitefish Captured by Shocker Boat Below Falls in Delta River, 1974.

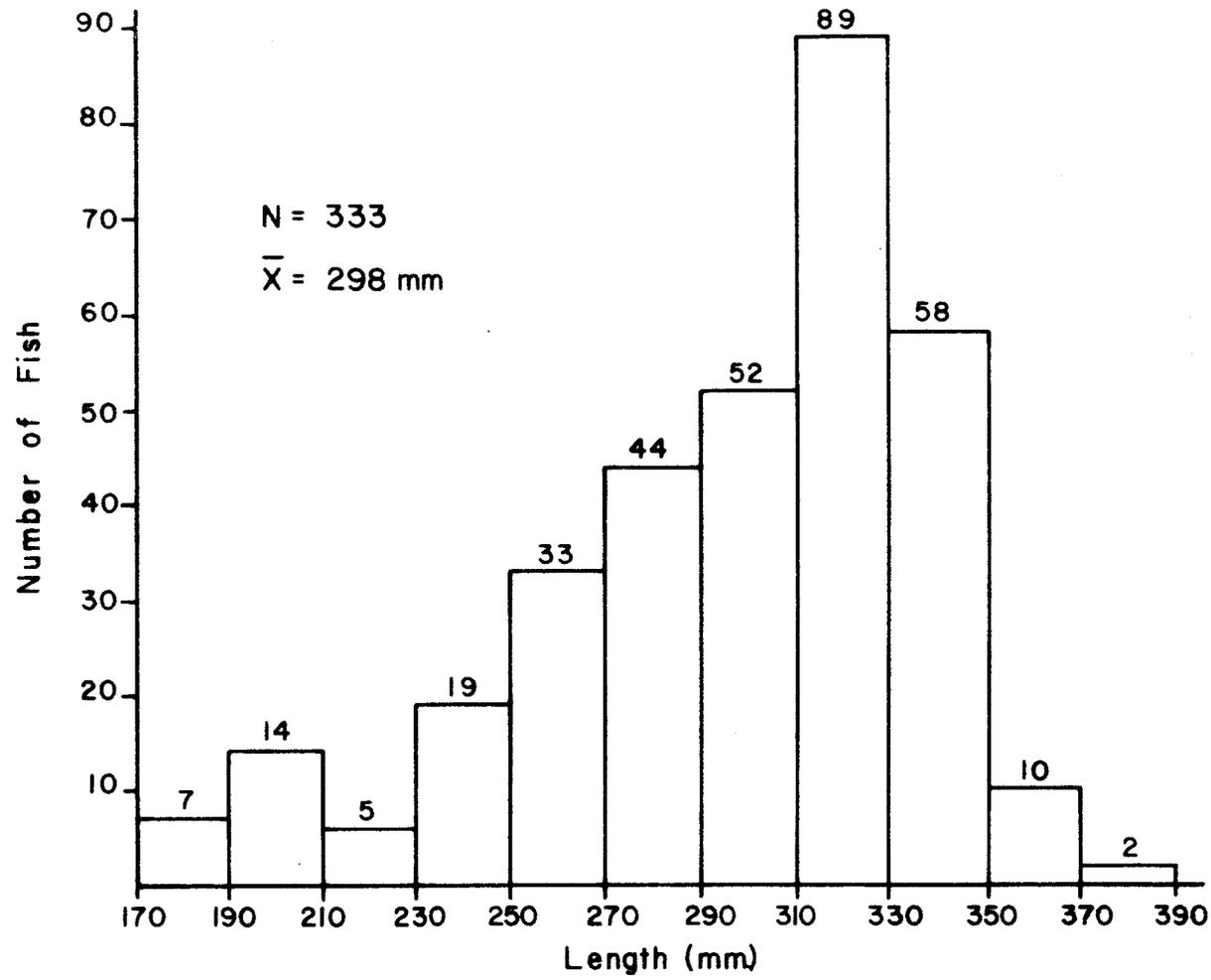


Figure 5. Length Frequency of Grayling Captured by Hook and Line Above the Falls in Delta River, 1974.

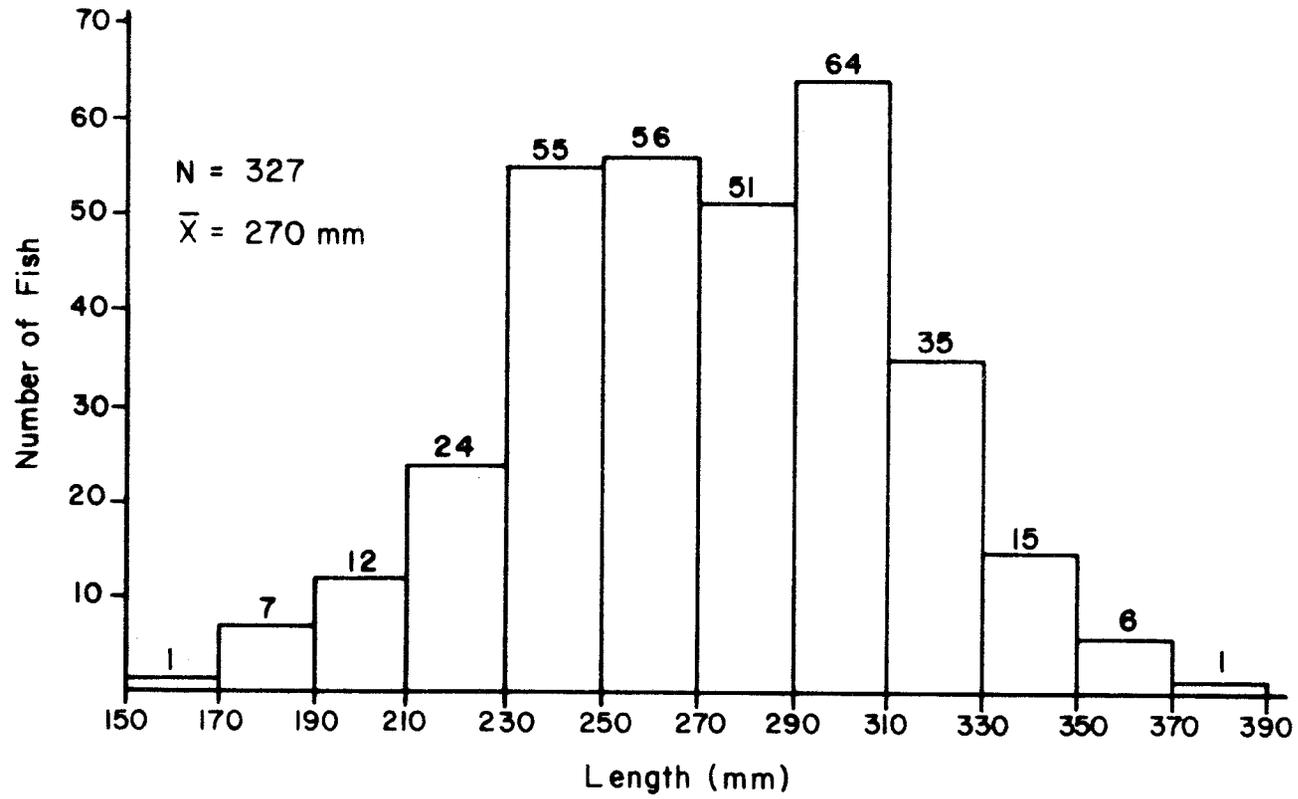


Figure 6. Length Frequency of Grayling Captured by Hook and Line Below the Falls in Delta River, 1974.

Table 8. Age Composition of 209 Grayling From Tangle Lakes and Delta River, 1973.

Age	Number	Length (mm)	
		Range	Mean
I	3	116-139	127
II	4	170-193	181
III	27	178-293	239
IV	89	240-330	292
V	69	273-387	322
VI	14	295-380	345
VII	<u>3</u>	370-400	387
Total	209		

Delta Clearwater River and Clearwater Lake Grayling Enhancement Study

Although grayling are present throughout the summer, past studies (Pearse, 1974) indicate that grayling reproduction is nearly nonexistent and the occurrence of small rearing grayling is low in both the Delta Clearwater River and Clearwater Lake. The purpose of this enhancement study is to evaluate the feasibility of strengthening future year classes through artificial propagation. On June 13, 1974, 100,000 grayling fry were stocked in the left (north) fork of the Delta Clearwater River. The fry were distributed by boat from three miles above the forks down to the forks. Most were released in the upper two miles of the section. Approximately 200 fry were placed in a 2' x 2' x 2' square test cage in the left fork approximately 100 feet above the confluence with the right fork.

The left fork was selected for experimental stocking since few fish, other than rearing silver salmon, are present during the summer, although it is physically similar to the right fork (Pearse, 1974) where a good summer population of grayling and whitefish occur.

On June 12 and 13, 1974, a total of 150,000 grayling fry was stocked over spring-fed gravel areas along the south shore of Clearwater Lake and in the main inlet stream.

Observations and sampling during August and September, resulted in only two grayling fingerling being observed. On August 14, one grayling was captured with a small mesh dip net and another observed in the left fork of Clearwater River. No grayling were observed in Clearwater Lake during a foot survey of the stocked areas on August 16.

Sampling of the left fork and the main Clearwater below the forks with a back pack shocker on September 11 was effective in capturing rearing silver salmon; however, no grayling were observed. It is possible that most of the grayling fry drifted downstream into the main channel of the Delta Clearwater River prior to late summer sampling.

Approximately 30 grayling fry survived in the test cage in the left fork until September 11, when it was last inspected. Further sampling, observations, and enhancement studies are planned for 1975.

Lakes Evaluated For Rehabilitation

Three lakes, Chet, "J", and Nickel were surveyed to provide pre-rehabilitation information. Physical and chemical data as well as fish species composition are presented in the lake surveys section.

Complete pre-rehabilitation reports have been submitted and rotenone purchased by the U.S. Army is on hand for tentative 1975 rehabilitation.

Silver Salmon Egg Take

An experimental silver salmon egg take was conducted on the Delta Clearwater River on October 14 and 15, 1974. Spawners were collected with boat mounted electro-fishing gear. A total of 169,800 eggs was taken and transported to the Fire Lake Hatchery at Eagle River. Total mortality during the first five months was 21,300 (12.5%), leaving 148,500 viable eggs on March 20, 1975.

Delta Clearwater River - Round Whitefish Utilization Study

Round whitefish are present throughout the fall, winter, and early spring in the Tanana River near the Richardson Highway bridge at Big Delta. Beginning in October, fall spawning chum salmon, *O. keta*, are present in large numbers along the south bank of the Tanana River. At that time, small number of local anglers fish selectively for round whitefish, using salmon eggs for bait. Whitefish and grayling are sometimes caught through the winter, although pressure and success is light until March or April when fishing for grayling becomes popular. Whitefish are caught in moderate numbers incidental to grayling fishing at that time. In early to mid-April round whitefish enter the lower mile of the Delta Clearwater River and Mile One Slough where they remain in large concentrations for approximately a week before spreading on throughout the river.

In addition to hook and line harvest, some spearing of round whitefish also occurs near the Tanana River bridge, from October to January.

Experimental angling was conducted on the Delta Clearwater River during the period from June 26 to July 11, 1974, in an effort to develop techniques for sport harvesting round whitefish. Small artificial lures, artificial flies, and live bait (redworms) were tested, utilizing spinning gear with a 1 3/4/lb. test tippet. Ten round whitefish were caught during 25.5 man hours of effort for a catch rate of 0.39 fish/hr.

Round whitefish were caught using redworms, artificial flies, and artificial flies baited with redworms. The most successful method used was redworms baited on a #12 single egg hook with the line weighted to allow the bait to drift slowly along the bottom. Fishing was done mostly in shallow pools below a riffle where a school of whitefish could be observed. Success was best when conditions allowed good visibility and the bait could be drifted directly in front of the fish. Because of the small, delicate mouth of the round whitefish a very light touch on the part of the angler was necessary to prevent tearing the hook from the fish's mouth.

Access Evaluation

During the reporting period sport fishing access easement proposals were submitted for waters within native village withdrawals under the Alaska Native Claims Settlement Act.

In addition, the Division of Lands, in December, 1974, initiated a Land Use Planning Study for state lands in the Delta Junction area. Various state and federal agencies were asked to submit resource inventory data for the 3,024 square mile area encompassing the middle Tanana River drainage including the Salcha, Goodpaster, Delta, and Johnson rivers. Assistance was provided to habitat biologists in identifying general and critical habitat areas, stocked lakes and lakes with fish stocking potential, and important access routes to fishing areas.

Effects of Pipeline Construction Activity

Monitoring of fishing pressure within the Delta District was conducted during the reporting period to evaluate possible increased utilization due to Trans-Alaska Pipeline construction activity. This routine monitoring as well as more intensive creel census on heavily used waters indicated no significant increase in pressure in 1974 as a result of construction activity. However, two large construction camps in the area, one located at Big Delta and the other at Isabel Pass near Paxson were completed during the winter (1974-1975) and are expected to reach capacity occupancy by spring, 1975.

Each camp is expected to accommodate approximately 1,200 people. As a result, it is expected that area waters will receive a significant increase in fishing pressure in 1975. It is anticipated that certain quality fishing waters being served by guides and transporters may receive dramatic increases in usage.

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